## II. REMARKS

Claim 3 has been amended to recite the relationship "$0.20 \leq [Co]+0.5[P]+0.9[Sn]+0.1[Zn]+[Mn]+[Mg]+[Y]+3[Zr] \leq 0.54$," which is supported on page 5, lines 19-21, of Applicant's specification as originally filed.

Claim 33, which depends upon claim 1, has been added and recites "wherein thermal conductivity of the heat resistance copper alloy material is higher than 0.57 cal/cm·sec·°C" as supported on page 11, lines 14-19, of Applicant's specification as originally filed.

Claim 34, which depends upon claim 6, has been added and recites "wherein the brazing treatment comprises treatment of the alloy material at 800°C for 10 minutes followed by cooling at a rate of 20°C per minute" as supported on page 11, lines 28-36, of Applicant's specification as originally filed.

The present amendment adds no new matter to the above-captioned application.

### A. The Invention

The present invention pertains broadly to a heat resistance copper alloy material, such as may be used to make, for example, a heat exchanger tube and piping. In accordance with an embodiment of the invention, a heat resistance copper alloy material is provided that includes features recited by independent claim 1. Various other embodiments, in accordance with the presently claimed invention, are recited in the dependent claims.

An advantage provided by the various embodiments, in accordance with the presently claimed invention, is that a heat resistant copper alloy material is provided that exhibits high proof stress and thermal conductivity properties, which makes the material suitable for use in making heat exchanger tubes of the heat exchanger and the like.

**B. The Rejections**

Claims 3, 15 and 25-28 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

Claims 1, 3, 5-13, 15 and 25-28 stand rejected under 35 U.S.C. § 103 as unpatentable over JP 10-130754 (hereafter, the "JP'754 Document").

Applicant respectfully traverses the Examiner's rejections and requests reconsideration of the above-captioned application for the following reasons.

**C. Applicant's Arguments**

In view of the present amendment, claims 1, 3, 5-13, 15, 25-28, 33 and 34 are in compliance with 35 U.S.C. § 112.

**i. The Section 103 Rejection**

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation, or other legitimate reason, for combining the references in the manner claimed. KSR International Co. v. Teleflex Inc., 127 S.Ct. 1727, 1739-41 (2007); In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). In this case, the Examiner has failed to establish a prima facie case of obviousness against Applicant's claimed invention because the JP'754 Document does not teach each and every claimed limitation, arranged as in the claims.

**ii. The JP'754 Document**

The JP'754 Document discloses a "heat resistant copper base alloy," wherein the heat resistant copper base alloy contains, by weight, 0.10 to 1.0% Co, 0.10 to 1.0% Sn, 0.02 to

0.20% P, 0.01 to 2.0% Zn, and the balance Cu with inevitable impurities, and if required, one or two kinds of elements selected from 0.05 to 0.7% Ni, 0.05 to 0.5% Fe, 0.01 to 0.30% Mn and 0.005 to 0.10% Mg added thereto (See Patent Abstracts of Japan corresponding to JP'754 Document). The JP'754 Document also discloses various sample alloys as shown in Table 1. Compositions and properties of Sample Alloy Nos. 1, 2, 3, 4, 12, 13 and 14 are tabulated in attached Exhibit A, which is an exhibit attached to a Declaration of Keiichiro Oishi under 37 C.F.R. § 1.132 (hereafter, the "Oishi Declaration"), and which may be used to compare elemental compositions of these alloys, and certain alloy properties, with those of the presently claimed invention recited by independent claim 1.

As evident from Exhibit A, alloys disclosed by the JP'754 Document do not overlap the alloy recited by independent claim 1. Specifically, for each of the Sample Alloys Nos. 1-4 and 12-14, at least two elements fall outside of the claimed range for every embodiment as evident from the highlighted portions of Exhibit A (Oishi Declaration, ¶ 9). Furthermore, none of the embodiments of Sample Alloy Nos. 1-4 and 12-14 satisfies the formula "$2.4 \leq ([Co]-0.02)/[P] \leq 5.2$ and $0.20 \leq [Co]+0.5[P]+0.9[Sn]+0.1[Zn] \leq 0.54$" as recited by independent claim 1, which is related to producing improved thermal conductivity characteristics, improved extrusion characteristics and improved bending characteristics. Therefore, the JP'754 Document does not teach, or even suggest,

> "wherein each content of Mn, Mg, Y, Zr and said additive elements satisfies the relationship
> $0.20 \leq [Co]+0.5[P]+0.9[Sn]+0.1[Zn]+[Mn]+[Mg]+[Y]+3[Zr] \leq 0.54$,
> wherein [Mn], [Mg], [Y] and [Zr] are said mass percents of Mn, Mg, Y and Zr content, respectively,"

as recited by claim 1.

For all of the above reasons, the JP'754 Document cannot anticipate, or render obvious, the subject matter of independent claim 1. Furthermore, the embodiments disclosed by the JP'754 Document do not demonstrate "thermal conductivity of the heat resistance

copper alloy material is higher than 0.57 cal/cm·sec·°C" as recited by claim 33 (Oishi Declaration, ¶¶ 10 and 18, and Exhibit A).

**ii. The Examiner's Official Notice**

With respect to claim 6, which recites "wherein 0.2% proof stress is higher than or equal to 55 $N/mm^2$ after a brazing treatment or a heat treatment under the same condition as said brazing treatment," the Examiner admits that the JP'754 Document does not disclose the claimed range of 0.2% proof stress (Office Action, dated May 15, 2008, at 3, lines 22-23). However, the Examiner contends that "[i]t is known in the art of cited reference yield strength is about 80% of ultimate tensile strength" (Office Action, dated May 15, 2008, at 3, lines 23-24). Applicant respectfully traverses the Examiner's "Official Notice" on the grounds that it asserts false facts.

Applicant reminds the Examiner that the Administrative Procedure Act requires Examiner's rejections to employ "reasoned decision making" based on evidence from a fully developed administrative record. In re Lee, 61 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 2002). Patentability determinations that are based on what the Examiner believes is "basic knowledge" and "common sense," and that otherwise lacks substantial evidentiary support, are impermissible. In re Zurko, 59 U.S.P.Q.2d 1693, 1697 (Fed.Cir. 2001). Therefore, Applicant respectfully traverses the Examiner's Section 103 rejection of claim 6 on the ground that the "Official Notice" lacks "substantial evidentiary support." Therefore, the Examiner must now adduce substantial evidentiary support (e.g., produce a prior art reference) with respect to the subject matter claimed, or withdraw the Section 103 rejection standing against claim 6.

The Examiner erroneously contends that yield strength is about 80% of ultimate tensile strength, and then argues that Applicant's claimed yield strength would have been

overlapped by the composition alloys disclosed by the JP'754 Document because the tensile strength shown in Table 3 of the JP'754 Document is much higher than the claimed yield strength (Office Action, dated May 15, 2008, at 3, lines 24-26). Applicant points out that the Examiner's allegations of fact (i.e., the Official Notice) are simply false for the following reasons.

As would be known by a person of ordinary skill in the art, tensile strength and yield stress drop to a lower value when a copper alloy is heated (See, e.g., Applicant's specification, at 1, line 23, to 2, line 8; and Oishi Declaration, ¶ 14). 0.2% yield strength is defined, in accordance with the present invention, after brazing, or other equivalent heat treatment, has been performed (See, e.g., claim 6). Thus, in accordance with this embodiment of the present invention, heat treatment was conducted under the same conditions as brazing. As recited by claim 34, "the brazing treatment comprises treatment of the alloy material at 800°C for 10 minutes followed by cooling at a rate of 20°C per minute." Heat treatment at temperatures of 800°C is much higher than the commonly-used temperature of 300-600°C used for annealing (Oishi Declaration, ¶ 14). Therefore, as would be instantly realized by a person of ordinary skill in the art, the yield stress would be substantially lower for copper alloy material subjected to temperatures of a brazing treatment than annealed copper alloy material subjected to annealing temperatures.

Exhibit B (Data Sheet No. A 6 Cu-DHP, Consel International Pour Le Developpement Du Cuivre, pp. 1, 2 and 4 (1968)), filed with the Oishi Declaration, pertains to phosphorus-deoxidised copper (high residual phosphorus). Exhibit B discloses properties of copper alloy (i.e., deoxidized copper) containing 0.013-0.050% phosphorus, by weight. Exhibit B discloses, at 2, Section 3, annealing conducted in the temperature range of 250-650°C. According to the data compiled in the Table on page 4 of Exhibit B, tensile strength is 22 $kg/mm^2$ (i.e., approximately 220 $N/mm^2$) for a plate and a rod, while yield stress is 5

$kg/mm^2$ (i.e., approximately 50 $N/mm^2$) for the same structures. Exhibit B also discloses in the Table on page 4 that tensile strength is 24 $kg/mm^2$ (i.e., approximately 240 $N/mm^2$) for a tube, while yield strength is 6 $kg/mm^2$ (i.e., approximately 60 $N/mm^2$) for this structure. Thus, in the case of phosphorus deoxidized copper, Exhibit B suggests that yield stress is less than 25% of tensile strength for phosphorus-deoxidized copper (Oishi Declaration, ¶ 15). As discussed above, yield stress tends to lower as temperature to which the alloy is exposed rises. Therefore, the percentage difference between yield stress and tensile strength should be even greater given the higher temperatures employed for brazing than for annealing alloy (Oishi Declaration, ¶ 15).

In sum, Exhibit B shows that the Examiner's Official Notice with respect to yield strength being 80% of tensile strength is not a true relationship for all metals, such as phosphorus-deoxidized copper (Oishi Declaration, ¶ 13).

Exhibit C (Copper Parts Data Book, pages 88 and 94 (1997)), filed with the Oishi Declaration, contains data pertaining to softening characteristics of alloy. In the graphs shown on pages 88 and 94 of Exhibit C, the vertical axis corresponds to yield stress and the horizontal axis corresponds to temperature (Oishi Declaration, ¶ 16). $\sigma\beta$, $\sigma 0.2$, and $\delta$ represent curves of tensile strength, yield stress, and elongation, respectively (Oishi Declaration, ¶ 14). As evident from Exhibit C, tensile strength and especially yield stress decrease at the temperature range of 200-300°C, while elongation increases. As temperature increases, tensile strength and yield stress continue to drop. As shown in Figure 5.4-28 on page 94 of Exhibit C, tensile strength and yield stress are 260 $N/mm^2$ and 50 $N/mm^2$, respectively, for the condition of 500°C for 30 minutes. Thus, Exhibit C demonstrates a similar relationship between tensile strength and yield stress as shown by Exhibit B in that yield stress is about 19% that of the tensile strength (Oishi Declaration, ¶ 17). In addition, when the temperature rises to 800°C (for 30 minutes), tensile strength and yield strength drop

to 220 $N/mm^2$ and 25 $N/mm^2$, respectively, according to Exhibit C (Oishi Declaration, ¶ 17). Thus, in the case of annealed alloy material at 800°C, the yield stress decreases to as low as 11% that of the tensile strength (Oishi Declaration, ¶ 17).

In sum, Exhibit C further demonstrates that the relationship between yield stress and tensile strength is not as asserted by the Examiner in the erroneous Official Notice relied upon by the Examiner to reject claim 6 of the present application (Oishi Declaration, ¶¶ 17 and 18). For all of the above reasons, then, the JP'754 Document cannot anticipate, or render obvious, the subject matter of claim 6.

**iii. No Reasonable Expectation of Success**

The Examiner has also failed to establish a prima facie case of obviousness against the claimed invention because the Examiner has failed to establish a reasonable expectation of success of arriving at the claimed invention based on the teachings of the JP'754 Document. The Federal Circuit has ruled that a proper rejection under Section 103 requires showing (1) that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process, and (2) that the person of ordinary skill in the art would have had a reasonable expectation of success in doing so. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, the Examiner has failed to establish a reasonable expectation of success of arriving at Applicant's claimed invention based on the subject matter disclosed by the JP'754 Document.

Specifically, the alloy composition of the present invention is only overlapped in part by the subject matter disclosed by the JP'754 Document. Consequently, the JP'754 Document does not necessarily produce a copper alloy material, which when heated at a temperature in accordance with the present invention such as a brazing temperature of over 600°C, that maintains high thermal conductivity and proof stress characteristics along with excellent stress

corrosion crack resistance. Furthermore, the JP'754 Document discloses a vast range of compositions that are not suitable for use when hot-extruding tubes and bending. The present invention addresses this issue by constraining the composition to satisfy the following formula:

$$0.20 \leq [Co]+0.5[P]+0.9[Sn]+0.1[Zn]+[Mn]+[Mg]+[Y]+3[Zr] \leq 0.54,$$

wherein [Mn], [Mg], [Y] and [Zr] are mass percents of Mn, Mg, Y and Zr content, respectively. This relationship is not taught, or even suggested, by the JP'754 Document, and none of the sample alloys tabulated in Tables 1 and 2 of the JP'754 Document fall within the scope of the presently claimed invention (Oishi Declaration, ¶¶ 5, 8 and 9). Therefore, a person of ordinary skill in the art would not have had a reasonable expectation of arriving at the embodiment of the invention recited by independent claim 1 in view of the disclosure of the JP'754 Document.

As shown in Exhibit A, the Sample Alloy Nos. 1-4 and 12-14 of the JP'754 Document each have a thermal conductivity of less than 0.57 cal/cm·sec·°C (Oishi Declaration, ¶¶ 8, 10 and 18). Therefore, a person of ordinary skill in the art would have had no reasonable expectation of success of arriving at a "heat resistance copper alloy material...wherein thermal conductivity of the heat resistance copper alloy material is higher than 0.57 cal/cm·sec·°C" as recited by claim 33.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against Applicant's claimed invention.

**iv. Evidence of Non-obviousness**

Assuming the Examiner had established a prima facie case of obviousness against Applicant's claimed invention (which is a wholly invalid argument), Applicant submits data compiled with respect to Sample Alloy Nos. 1-4 and 12-14 (See Oishi Declaration, ¶¶ 6-8, and Exhibit A, filed herewith), which can be compared to alloys of the present invention

(See, e.g., Tables 1 and 5 of Applicant's specification). As evident from Exhibit A, the thermal conductivity of Sample Alloy Nos. 1-4 and 12-14 ranges from 0.46 to 0.53 cal/cm·sec·°C, which is substantially less than values of "higher than 0.57 cal/cm·sec·°C" as recited by claim 1 (See, e.g., Oishi Declaration, ¶¶ 10, 11 and 18).

The Federal Circuit has ruled that property limitations may define a composition and distinguish it from the prior art. E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co., 7 U.S.P.Q.2d 1129, 1133 (Fed. Cir. 1988). When the prior art discloses the structural limitations of the claimed composition, the burden shifts to the Applicant to demonstrate that the compositions of the claimed reference do not possess the claimed property. Id.

In this case, assuming *arguendo* that the JP'754 Document teaches the claimed composition (which is an invalid assumption), it is demonstrated by Exhibit A of the Oishi Declaration that the compositions disclosed by the JP'754 Document do not possess the claimed thermal conductivity property, namely, wherein "thermal conductivity of the heat resistance copper alloy material is higher than 0.57 cal/cm·sec·°C" as recited by claim 33 (Oishi Declaration, ¶¶ 6-8, 10, 11 and 18).

Therefore, even if the Examiner had established a prima facie case of obviousness against claim 33 (which is not the case here), Applicant has demonstrated the fact that the compositions disclosed by the JP'754 Document do not possess the claimed thermal conductivity property thereby overcoming the alleged prima facie case.

## III. CONCLUSION

In view of the present amendment, claims 1, 3, 5-13, 15, 25-28, 33 and 34 are in compliance with 35 U.S.C. § 112. Furthermore, the Examiner has failed to establish a prima facie case of obviousness against Applicant's claimed invention because the JP'754 Document does not teach each and every limitation, arranged as in the claims. Applicant has

also shown that the Examiner has failed to establish that a person of ordinary skill in the art would have enjoyed a reasonable expectation of success of arriving at Applicant's claimed invention based on the JP'754 Document. Applicant has also adduced evidence to show that the alloy compositions disclosed by the JP'754 Document do not possess the claimed range of thermal conductivity properties, namely, "thermal conductivity...higher than 0.57 cal/cm·sec·°C" as recited by claim 33.

For all of the above reasons, claims 1, 3, 5-13, 15, 25-28, 33 and 34 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

The below-signed attorney for Applicant welcomes any questions.

Respectfully submitted,

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